Bonneville Power Administration
Fish and Wildlife Program FY99 Proposal

Section 1. General administrative information

Monitor, Evaluate, And Research The Lake Roosevelt Fishery

Bonneville project number, if an ongoing project 9404300

Business name of agency, institution or organization requesting funding
Spokane Tribe of Indians

Business acronym (if appropriate) STOI

Proposal contact person or principal investigator:

Name Keith Underwood
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Subcontractors.

Organization	Mailing Address	City, ST Zip	Contact Name
WDFW	600 Capital Way N.	Olympia, WA 98501-2200	Craig Burley
Eastern Washington University	Biology Dept. M/S 72	Cheney, WA 99004	Dr. Allan Scholz
Eastern Washington University	Biology Dept. M/S 72	Cheney, WA 99004	Dr. Ross Black
Spokane Tribal Hatchery	P.O. Box 100	Wellpinit, WA 99040	Tim Peone
Colville Confederated Tribes	P O Box 150	Nespelem, WA 99155	Jerry Marco
Spokane Tribal Laboratories	P.O. 100	Wellpinit, WA 99040	Rudy Peone
Eastern Washington University	Water Research Center, M/S 72	Cheney, WA 99004	Linda Sexton
Washington State University	Water Research Center	Pullman, WA 99164-3002	Dr. William Funk

NPPC Program Measure Number(s) which this project addresses.
10.8B.5, 10.8A.11, 10.3E.5, 2.2E5 through 2.2E.7

NMFS Biological Opinion Number(s) which this project addresses.
Task No. 2.1.d of proposed recovery plan for Snake River salmon; "Conduct monitoring, evaluation and research to support flow augmentation efforts".

Other planning document references.

Subbasin.
Upper Columbia River

Short description.
Collect data to monitor, evaluate and research the fishery for construction of a management plan that contains mitigation actions and hydro-ops rule curves for Lake Roosevelt. Assess measures 10.8B.2 to 10.8B.4, 10.8B.9, 10.8B.11, and 10.3E3 to 10.3E.5..

Section 2. Key words

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
	Anadromous fish		Construction		Watershed
X	Resident fish		O & M		Biodiversity/genetics
	Wildlife		Production	+	Population dynamics
	Oceans/estuaries	+	Research	X	Ecosystems
	Climate	X	Monitoring/eval.		Flow/survival
+	Other	+	Resource mgmt		Fish disease
		+	Planning/admin.		Supplementation
			Enforcement		Wildlife habitat en-
			Acquisitions		hancement/restoration

Other keywords.
Modeling, Gas bubble disease, Nitrogen/TDG supersaturation, nutrient dynamics, ecological interactions, drawdown effects.

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
9104600	Spokane Tribal Hatchery	This program provides funding (appx. $120,000)to the Tribal

		Hatchery for fish tagging supplies and manpower. Hatchery provides approx. 500,000 rainbow trout and 1 million kokanee salmon to Lake Roosevelt..
9001800	Habitat Improvement Project	Annually estimates native adfluvial rainbow trout population--supplies data necessary to evaluating program objectives.
9501100	Chief Joseph Kokanee Enhancement Project	Estimates entrainment through Grand Coulee Dam. Provides data necessary to evaluate program objectives.
9700400	Resident fish stock status above Chief Joseph and Grand Coulee Dams	Identify stock status and centralize data bases for Upper Columbia River. Provides additional data which can be used to achieve goals of this program.
9500900	Lake Roosevelt rainbow trout net pens	Provide 500,000 rainbow trout to fishery . Assists in reaching program goals.
8605000	White sturgeon productivity, status and habitat requirements.	identifies sturgeon abundance and distribution in Lake Roosevelt.
9104700	Sherman Creek Hatchery	Provides 225,000 kokanee annually to achieve program goals, and is primary egg collection facility.

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Identify effects of lake operations and fishery management actions on the Lake Roosevelt ecosystem	a	Collect data on various trophic levels and habitat indices in Lake Roosevelt and relate to hydro-operations.
		b	Describe regulating mechanisms of various trophic levels and habitat indices
		c	Develop model that predicts hydro-operations and mitigation actions required to achieve biological objectives.

2	Monitor and evaluate the efficacy of fisheries management actions in Lake Roosevelt	a	Conduct standardized fish surveys to monitor changes in relative abundance, density, and diet
		b	Collect emmigration and entrainment data
		c	Conduct year round reservoir wide creel survey to assess fish harvest
3	Develop Lake Roosevelt Fishery Management Plan based on model results and management objectives	a	Within 4 years, develop and implement a management plan with hydro-op recommendations for Lake Roosevelt that is amenable to all managers and stakeholders and includes monitoring and evaluation components

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	4/1999	4/2002	70.00%
2	4/1999	12/2025	20.00%
3	4/1999	4/2003	10.00%
			TOTAL 100.00%

Schedule constraints.
Lack of funding will constrain project success. Model must be completed prior to completion of final stage of managemnt plan. M&E will not end, but be curtailled after appropriate m&E plan is identified in the management plan.

Completion date.
2003 (under current scope project will downsize in 2003 to conduct primarily monitoring and evaluation with less emphasis on research))

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel	Includes 4 biologists, 5 technicians and 6 CWT taggers	$320,128
Fringe benefits	20% of salaries	$64,025

Supplies, materials, non-expendable property	50,000 floy tags, 800,000 CWTs, tagging equipment sampling gear, tools, and field, office, lab misc.	$83,375
Operations & maintenance	Utilities insurance and repairs/maintenance	$20,700
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	Creel Boats	$80,000
PIT tags	# of tags:	
Travel		$36,750
Indirect costs	21.3% of contract less capital and sub-contracts	$111,820
Subcontracts		$783,202
Other		
TOTAL		$1,500,000

Outyear costs

Outyear costs	**FY2000**	**FY01**	**FY02**	**FY03**
Total budget	$1,500,000	$1,500,000	$700,000	$700,000
O&M as % of total	0.00%	0.00%	0.00%	0.00%

Section 6. Abstract

The Lake Roosevelt Monitoring / Data Collection Program specifically addresses section 10.8B.5 of the NPPC Fish and Wildlife Program. The current vision of the program is to establish ecological conditions and fish populations in Lake Roosevelt that provide long term readily accessible tribal subsistence fisheries and sport angler fisheries to substitute for the loss of anadromous fishes caused by the creation of Grand Coulee Dam. Program goals are two fold: 1) Develop an informed fisheries management plan with mitigation and water management recommendations that maximize the Lake Roosevelt fisheries while providing for the needs of other resources downstream, and 2) Monitor and evaluate the effects of stocking hatchery fish on the ecology of Lake Roosevelt and identify stocking strategies that maximize harvest opportunity and egg production. Program objectives include: 1) Monitor and evaluate the efficacy of current fisheries management actions in Lake Roosevelt, 2) Model the effects of lake operations and management actions on various trophic levels within Lake Roosevelt, and 3) Based on model results, develop a Lake Roosevelt Fisheries Management Plan (including biological and integrated rule curves) among co-managers and other stakeholders. Data collection is performed utilizing standardized methods for fish, water quality and laboratory analyses, and data collection and modeling efforts should be complete by 2003. A monitoring and evaluation phase will follow to assess model performance and resultant management actions.

Section 7. Project description

a. Technical and/or scientific background.

This program has historically been funded to assist with the establishment of a viable fishery in Lake Roosevelt as mitigation for lost salmonid runs blocked by the construction of Grand Coulee Dam. Assistance in this case refers to evaluation and monitoring of restorative efforts, and further examination of methodologies (and their feasibility) to most effectively restore a fishery. This program is explicitly described in section 10.8B.5 of the 1994 FWP and assesses numerous measures (10.8B.2 to 10.8B.4, 10.8B.9, 10.8B.11, and 10.3E3 to 10.3E.5). Activities funded under the auspices of the NPPC in Lake Roosevelt are in place fish substitution. Earlier investigation by Scholz et al. (1986) has described the feasibility of restoring a fishery in Lake Roosevelt. The Lake Roosevelt Monitoring / Data Collection Program is currently collecting data necessary to develop biological and integrated rule curves for Lake Roosevelt as directed in measure 10.8B.5. The completion of required rule curves will allow for the establishment of the best possible fishery in Lake Roosevelt, while allowing maximal water availability for downstream concerns (i.e. flows necessary for successful salmonid recovery efforts in the mid and lower Columbia).

Water quality issues related to industrial effluents (Sheehan and Lamb 1987; Johnson et al. 1991), gas supersaturation (Elston and Rensel 1996) and heavy metals (USGS 1997) have historically been a concern of resource managers in the upper Columbia River. The Lake Roosevelt Monitoring / Data collection program has established a long term data base on the water quality of the lake, and will continue to monitor and evaluate trends in water quality as they relate to the lake ecosystem. Primary productivity of the reservoir has been found to be declining (Wilson 1996), potentially as a result of pollution abatement (Wierenga 1997, Cominco 1997). Continued investigations into changes in water quality and the effect on resident biota are necessary if a long term viable fishery is to be established in Lake Roosevelt.

b. Proposal objectives.

Hypothesis: A fisheries management plan with mitigation actions and hydro-ops recommendations will allow for the establishment of a successful resident fishery while maintaining sufficient flows for downstream water concerns (including salmonid fishery issues).

Assumption(s): Potential exists for substantial numbers of resident fish of high quality to be available for harvest from Lake Roosevelt while simultaneously allowing sufficient water allotment for other concerns (i.e. power production, downstream salmonid issues).

Biological objectives:

Species	Stock	Harvest Goal	Escapement Goal	Avg. size (lbs)	Year achieved
Kokanee	Hatchery	290,000	10,000	2.0	2000
Kokanee	Wild	120,000	60,000	1.5	*

	(adfluvial)				
Rainbow Trout	Net pen	190,000	NA	2.0	1997
Rainbow Trout	Wild (adfluvial)	12,000 (interim goal)	6,000	2.0	2000
Rainbow Trout	Wild (adfluvial)	150,000 (final goal)	74,000	2.0	TBD
Walleye	Wild	131,000	Unknown	1.5	1996

*= Target date will be determined upon completion of baseline investigations, NA=Not Applicable, TBD=To be determined after interim goal is achieved

Other measurable objectives: Biological (2002) and integrated (2003) rule curves for Lake Roosevelt to help balance costs / benefits of reservoir operations to all stakeholders.

c. Rationale and significance to Regional Programs.

Lake Roosevelt is a substantial source of water for anadromous flow augmentation. However, conflicts have arisen downstream anadromous flow issues and in reservoir resident fish issues. This study will attempt to resolve these conflicts by balancing the flow needs of each and identifying mitigation actions within Lake Roosevelt which could offset resident fish needs and allow for increased downstream flows. As stated above, the working hypothesis of this program is: A fisheries management plan with mitigation actions and hydro-ops recommendations will allow for the establishment of a successful resident fishery while maintaining sufficient flows for downstream water concerns (including salmonid fishery issues). This hypothesis (and objectives 1 and 2) directly addresses measure 10.8B.5 of the 1994 Fish and Wildlife Program. The Lake Roosevelt Monitoring / Data Collection Program is currently collecting data necessary to develop biological and integrated rule curves for Lake Roosevelt as directed in measure 10.8B.5. This program also assesses numerous measures (10.8B.2 to 10.8B.4, 10.8B.9, 10.8B.11, and 10.3E3 to 10.3E.5) described in the 1994 Fish and Wildlife Program, and provides an opportunity to learn from implementation of these measures as directed in section 2.2H. In addition, sections 2.2E.5, 2.2E.6 and 2.2E.7 of the 1994 Fish and Wildlife Program specifically relate to funding priority and justification of this program. Objective 3 of this project also addresses Section 10.8 (Resident Fish Substitutions) of the 1994 Fish and Wildlife Program.

Task No. 2.1.d of the proposed recovery plan for Snake River salmon calls for conducting 'monitoring, evaluation and research to support flow augmentation efforts'. Completion of rule curves for Lake Roosevelt will maximize benefits to both resident and downstream anadromous fish stocks.

The Lake Roosevelt Monitoring / Data Collection Program is currently sharing equipment and personnel with various other projects to the extent possible as defined by project objectives, time schedules, and equipment needs. These projects are listed in Section 8 of this proposal.

Additionally, the Spokane Tribe has provided $220,000 dollars (FY'97 figure) to assist with the building of an adult kokanee salmon collection facility on the southeastern boundary of the reservoir (Little Falls Dam). The facility will enable the Tribe to collect kokanee salmon eggs from migrating adults. This in conjunction with the Sherman Creek Hatchery will increase egg collection capabilities and help to meet the projects biological objectives.

d. Project history

The Lake Roosevelt Lake Roosevelt Monitoring / Data Collection Program is the result of a merger between two projects, the Lake Roosevelt Monitoring Program (BPA No. 8806300) and the Lake Roosevelt Data Collection Program (BPA No. 9404300). These projects were merged because each required support staff and data from the other to complete its deliverables.

The Lake Roosevelt Monitoring Program began in July, 1988. The intent of the project was to: 1) determine the status of fish stocks in Lake Roosevelt before construction of hatcheries and habitat improvement efforts; 2) Evaluate contribution of habitat improvement projects and hatcheries to the Lake Roosevelt Fisheries,; 3) provide recommendations to hatcheries for outplanting strategies which maximized harvest of kokanee and rainbow trout and egg collections from kokanee.

In 1991, the Lake Roosevelt Data Collection Project began operating under the Lake Roosevelt Monitoring Project contract number. The purpose of the Data Collection Project was to assist the resident fish workgroup of the System Operation Review with the development of the EIS. The Project collected data on biotic indices of Lake Roosevelt believed to be effected by lake operations. Those indices included zooplankton density and biomass, water quality, fish growth and fish entrainment through Grand Coulee Dam. In 1994, the Data Collection Project was given its own contract and project number.

The merged project combined efforts in 1996 to continue work historically completed and to identify data needs to develop biological and integrated rule curves for Lake Roosevelt as required in the NPPC Fish and Wildlife Program (10.8B.5).

Lake Roosevelt Monitoring Project submitted annual reports to BPA for each year from 1989 through 1995 (Peone et al. 1990; Griffith and Scholz, 1991; Thatcher et al. In Press-a and In Press-b; Underwood and Shields, 1996; Underwood et al., 1996 and 1997), monthly progress reports from May, 1993 through Dec. 1995, and quarterly progress reports from June through December, 1996.

Lake Roosevelt Data Collection Project submitted annual reports to BPA for each year from 1991 through 1995 (Griffith et al. 1995; Griffith and McDowel 1996; Voeller 1996, Shields and Underwood 1996 and 1997), and monthly progress reports from June 1991 through December 1995.

The 1996 annual report for the Lake Roosevelt Monitoring / Data Collection Program (Cichosz et al. In Press) has been submitted to BPA, as were quarterly progress reports in 1996.

Examples of adaptive management strategies resulting from this project include revisions in hatchery release strategies for kokanee and rainbow trout. Kokanee are now

released as post-smolts rather than fry in order to minimize losses due to entrainment and predation, and to maximize harvest potential. Rainbow trout release timings have similarly been altered with beneficial results based on mortality and entrainment studies conducted under this project. In addition, kokanee salmon are chemically imprinted in the hatchery prior to release to maximize returns to egg collection facilities (Scholz et al. 1992 and 1993, Tilson et al. 1994 and 1995).

In 1997 the Lake Roosevelt Monitoring / Data Collection Program increased data collection efforts substantially to assist in development of the ecosystem based model. Additional efforts were allocated towards better defining the relationships of water quality and production at the various trophic levels within the system. Continuation of this additional effort will greatly assist in defining trophic interactions and the effects of hydro-ops on the Lake Roosevelt ecosystem.

e. Methods.

A) Research

I. Collect habitat data
   a) Develop a bathymetric map of Lake Roosevelt in a GIS system
      i) Fund BOR or other entity to complete a GIS map of the Lake
      ii) Collect bathymetric sounding of lake to verify accuracy of GIS map
   b) Collect data and build map layers for habitat variables (vegetation, substrate type, structure, etc...)
   c) Vertical profile water quality data; hydrolab, nutrient levels, metal loads (eleven sites - monthly or twice/month dependent on season)

II. Collect primary productivity data (eleven sites - monthly or twice/month)
   a) Vertical profile chlorophyll a
   b) Collect phytoplankton samples for identification and enumeration

III. Collect secondary productivity data
   a) Collect zooplankton via vertical pulls (eleven sites - monthly or twice/month)
   b) Conduct in situ zooplankton experiments to develop life history tables
   c) Collect zooplankton near and off shore to examine spatial differences in density and speciation

IV. Collect population dynamics data on target fish species
   a) Trap, gillnet and electrofish littoral fish species or fish in littoral zone.
   b) Conduct multiple mark - recapture studies to attain population estimates of target species, particularly walleye
   c) Plot fish distribution / estimate population density by mobile hydroacoustics
   d) Trawl / purse seine for pelagic species to determine species composition

V. Collect angler use data
   a) Conduct a year round reservoir wide creel survey
   b) Conduct augmented creel surveys
   c) Reference fish guide journals
   d) Angler journal program

VI. Collect emigration / entrainment data

a) Floy tag kokanee and net pen rainbow trout prior to release
b) Plot fish distribution and estimate population size in forebay with mobile hydroacoustics
c) Collect tagged fish at dams below Grand Coulee

VII. Collect return efficiency data on hatchery origin kokanee
a) Adipose clip and CWT hatchery origin kokanee
b) Imprint fish with morpholine in hatchery and drip morpholine at release sites during spawning season
c) Intensively sample spawners by trap and electrofish to assess return rates

VIII. Collect total dissolved gas data throughout Lake Roosevelt
a) Vertical profile TDG (eleven sites - monthly or twice/month)

B) Model Development

I. Columbia River hydro-ops model and Lake Roosevelt detailed hydro-ops model
a) Obtain Columbia River hydro-ops model (PC based SSARR)
b) Develop hydro-ops model for Lake Roosevelt that plugs into SSARR model
c) Use bathymetric map to determine chances in lake volume, velocity and littoral area with each foot of drawdown and change in inflow / outflow

II. Biological Model of Lake Roosevelt
a) Build a plug-in for biological model to the hydro-ops model
b) Model effects of biotic and abiotic factors on each trophic level based on historic data and that collected in next 3 years

III. Monitor and evaluate model once recommended operations are implemented

C) Data analysis

I. Detailed descriptions of data analysis related to this project can be found in the 1996 Annual Report (Cichosz et al. In Press)

f. Facilities and equipment.

Office and laboratory space utilized by the Lake Roosevelt Monitoring / Data Collection Program (LRMDCP) are located within the Spokane Tribal Natural Resources Building in Wellpinit, WA. Storage space for boats, equipment and supplies is available at two locations on the Spokane Reservation; a 36x40' metal building located adjacent to the natural resources building, and a storage facility located near Little Falls Dam.

Three vehicles are owned and/or utilized by the LRMDCP; a 1 ton Dodge pickup (dually) equipped with electric brakes, a 3/4 ton Ford pickup equipped with a snowplow, and a 1/2 ton Chevy pickup. The LRMDCP also utilizes a 33' Bounder motorhome to house employees during extended field efforts.

The LRMDCP owns and/or utilizes four boats; a 15' fiberglass Boston Whaler with a 90 hp outboard engine, a 19' Bildwel aluminum boat with 135 and 9.9 hp outboard engines, a 21' Smith Root electrofishing boat with a 200 hp outboard engine, and a 21' Smith Root electrofishing boat with an inboard engine and jet drive. All boats are equipped with individual trailers and can be effectively towed with the vehicles currently available within the LRMDCP.

Computer systems currently in use by the LRMDCP include 2 Power Macintosh systems, one Macintosh Quadra 650, and a Macintosh Powerbook, a Pentium PC, and a network equipped PC to serve as a network hub within the LRMDCP.

The LRMDCP currently has all necessary field equipment to conduct the sampling described in this proposal. Equipment which is subject to high use and wear (i.e. gillnets) are repaired when appropriate and replaced as necessary.

The LRMDCP anticipates the purchase of a trawler and hydroacoustics equipment (FY'98) to conduct various investigations in Lake Roosevelt including density / population estimates of pelagic fish species (e.g. kokanee salmon), fish distributions (spatial and temporal), and substrate definition / mapping.

g. References.

Cichosz, T.A., J.P. Shields and K.D. Underwood. In Press. Lake Roosevelt Monitoring / Data Collection Program. Annual Report 1996. Bonneville Power Administration, Portland, Oregon. Project No. 94-43.

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Peone, T., A.T. Scholz, J.R. Griffith, S. Graves, and M.G. Thatcher. 1990. Lake Roosevelt fisheries monitoring program. Annual Report, 1988-89. Bonneville Power Administration. Portland, Oregon.

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kokanee salmon (*Oncorhynchus nerka*): Implications for operating Lake Roosevelt kokanee hatcheries, annual report 1991. Bonneville Power Administration. Portland, Oregon. Project No. 88-63.

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Thatcher, M.G., J.R. Griffith, A.C. McDowell, and A.T. Scholz. (In press-a, submitted 1993). Lake Roosevelt Fisheries Monitoring Program, annual report 1991. Bonneville Power Administration. Portland, Oregon. Project No. 88-63.

Thatcher, M.G., A.C. McDowell, J.R. Griffith, and A.T. Scholz. (In press-b, submitted 1994). Lake Roosevelt Fisheries Monitoring Program, annual report 1992. Bonneville Power Administration. Portland, Oregon. Project No. 88-63.

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Wierenga, R.E. 1997. Investigation into the primary productivity of Lake Roosevelt, Washington. Interim Report to Spokane Tribe of Indians. State of Washington Water Research Center. Washington State University, Pullman, Washington.

Wilson, G. 1996. Nutrient and trophic state reduction in the Franklin D. Roosevelt Reservoir of Washington State. Masters Thesis. Washington State University. Pullman, Washington.

Section 8. Relationships to other projects

The Lake Roosevelt Monitoring and Data Collection Program (LRMDCP) is directly related to numerous other BPA and NPPC funded projects within the basin:

Project Number	**Relationship**
BPA 9104600	Kokanee salmon and rainbow trout outplanting by the Spokane Tribal Hatchery. LRMDCP relies on the hatchery to conduct necessary marking and imprinting of fish for research needs, and evaluates the effectiveness of hatchery stocking strategies.
BPA 9104700	Kokanee salmon and rainbow trout outplanting by the Sherman Creek Hatchery. LRMDCP relies on the hatchery to conduct necessary marking and imprinting of fish for research needs, and evaluates the effectiveness of hatchery stocking strategies.
BPA 9500900	Kokanee salmon and rainbow trout outplanting by the Lake Roosevelt Net Pen Program. LRMDCP relies on the net pen program to assist in fish production to achieve biological objectives, and evaluates the effectiveness of hatchery stocking strategies.
BPA 9001800	The Habitat Improvement Project will provide information essential to the development of biological / integrated rule curves.
BPA 9501100	The Chief Joseph Kokanee Enhancement Project will provide information essential to the development of biological / integrated rule curves.
BPA 9502700	The Lake Roosevelt Sturgeon Project will provide information essential to the development of biological / integrated rule curves.
BPA 9700400	The Resident Fish Stock Status above Cheif Joseph and Grand Coulee Dams identifies status of various stocks and maintains a

	centralized database for the Upper Columbia River. These two projects are complimentary in that each relies on the other for pertinent information.
BPA 8605000	White Sturgeon Productivity Status and Habitat Requirements provides 'historical' or baseline information of sturgeon populations in Lake Roosevelt.
NPPC 10.8B.26	The Native Fish Stock Status will provide information essential to the development of biological / integrated rule curves.

Section 9. Key personnel

Name	Position	Primary Duties
Keith D. Underwood	Program Manager	Overall program oversight and direction; Contractual and financial obligations, Coordination with other management entities; Sub-contract oversight; Research planning and design.
Thomas A. Cichosz	Fisheries Biologist II	Oversight of day to day program operations including office, laboratory, and field activities; Research planning and design; Data analysis and report writing.

KEITH UNDERWOOD, M.S.
Project Manager

EDUCATION

M.S. Biology, Eastern Washington University, 1996
B.S. Biology, Eastern Washington University, 1992

EXPERIENCE

Project Manager--Spokane Tribe of Indians, Wellpinit, WA., January 1994 to present. Project Manager of the Lake Roosevelt Monitoring Program oversees administrative, planning, design, research and coordination activities. The program is collecting data and modeling the physical and biological attributes of the lake. The completed model will be used in the development of a fisheries management plan recommending a suite of hydro operations and management actions.

Project Biologist--Spokane Tribe of Indians, Wellpinit, WA. January 1994 to January 1993. Collected and analyzed data on water bodies contained within the Spokane Tribal Reservation for fisheries management planning. Assisted the Lake Roosevelt Monitoring Program with data collection. Participate in regional forums that coordinate fisheries management actions in the Columbia River.

Research Assistant II--Eastern Washington University, Cheney, WA., April 1992 to December 1992. Collected and analyzed population indices, diet, and microhabitat use of bull trout, chinook salmon and rainbow trout in three streams of southeast Washington to identify whether bull trout populations are negatively impacted from stocking of hatchery reared chinook salmon and rainbow trout. Also conducted spawning ground surveys by foot and migration behavior by radiotelemetry to better understand bull trout behavior.

Research Assistant I--Eastern Washington University, Cheney, WA. April 1991 to March 1992. Conducted backpack electrofishing surveys on three southeast Washington streams to estimate fish population density and collect diet information. Enumerated macroinvertebrates from Hess samples.

PUBLICATIONS

Author of masters thesis and five professional reports; including lead author of 1993 through 1995 annual reports for Lake Roosevelt Monitoring / Data Collection Program.

PROFESSIONAL PRESENTATIONS

Two professional presentations in past year, as well as numerous informal presentations.

PROFESSIONAL SOCIETIES

American Fisheries Society since 1991.
North American Lake Management since 1995.

THOMAS A. CICHOSZ, M.S.
Fisheries Biologist II

EDUCATION

M.S. Fisheries Resources, University of Idaho-Moscow, 1996
B.S. Water Resources/Biology, University of Wisconsin-Stevens Point, 1989

EXPERIENCE

Fisheries Biologist II--Spokane Tribe of Indians, Wellpinit, Washington. January 1997 to present.
Project biologist responsible for planning, design, coordination and execution of research and management surveys on Lake Roosevelt, Washington. Surveys relate to fisheries, limnology, and zooplankton and are directed toward both current management and future modeling efforts within the Lake Roosevelt ecosystem. Other responsibilities include data analysis and report writing, oversight and assessment of work completed by subcontractors, and scheduling of personnel and equipment resources.

Data Analyst--University of Idaho-Moscow. November 1996 to January 1997.
Used multivariate analyses to assess habitat use by juvenile chinook salmon in Lower Granite Reservoir. Included extensive use of SAS and other statistical software to perform canonical correspondence and discriminant analyses. Other responsibilities included report writing and assisting graduate students with SAS programming and data analysis.

Graduate Research Assistant--University of Idaho-Moscow. August 1994 to October 1996.
Performed extensive computer modeling of northern squawfish population dynamics using SAS statistical software. Also participated in studies examining predation of salmonids by smallmouth bass and diet composition of fishes in Lower Granite Reservoir. Conducted fishery surveys by electrofishing, gillnetting and beachseining.

Fisheries Bio-aide--Idaho Department of Fish and Game, Coeur d'Alene, Idaho. April 1994 to August 1994.
Captured white sturgeon and burbot and assisted in implantation of radio and sonic transmitters. Performed radio and sonic telemetry in lake and riverine setting. Collected sturgeon eggs to monitor spawn timing and success. Conducted backpack electrofishing surveys of Kootenai River tributaries.

Environmental Specialist, Ecology Department--Environmental Science & Engineering, Inc., St. Louis, Missouri. May 1990 to April 1994.
Four years of professional responsibility including training and supervision of temporary employees, and project budget and timeline oversight. Collected adult and larval fish, mussels, and macroinvertebrates. Also responsible for taxonomy of adult fish and benthic macroinvertebrates, various data operations and report writing.

PUBLICATIONS

Author of masters thesis and seven professional reports; including lead author of 1996 annual report for Lake Roosevelt Monitoring / Data Collection Program.

PROFESSIONAL PRESENTATIONS

Four professional presentations in past 2 years, as well as numerous informal presentations.

PROFESSIONAL SOCIETIES

American Fisheries Society since 1994.

Section 10. Information/technology transfer

All project information and data will be made available through annual reports submitted to BPA. In addition, ecosystem models developed under Objective 1 (Section 3) will be made available to the public and any interested agencies upon completion.

The project staff regularly attends workshops and conferences concerning relavent issues and presents project direction, findings, and implications within a professional forum.